

August 14, 2009

Mr. Walter Nied
On-Scene Coordinator
U.S. Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604

**Subject: Conceptual Plan for Landfill Gas Collection
Mallard North Landfill**

Dear Mr. Nied:

On behalf of the Forest Preserve District of DuPage County (FPD), RMT, Inc. (RMT), is submitting three copies of this Conceptual Plan for Landfill Gas Collection - Mallard North Landfill. As discussed during our August 6, 2009, meeting, the FPD intends to construct a landfill gas collection system (LFGCS) to address the potential for off-site migration of landfill gas (LFG) in two areas of the Mallard North Landfill (MNL). Following the U.S. EPA's review of this Conceptual Plan, a more detailed design plan will be prepared and submitted to the U.S. EPA for approval.

Background

Monitoring of the LFG probes at the MNL has been conducted over the past several months. Methane has been detected at certain probes at concentrations that have caused concern with respect to the potential for off-site LFG migration. Two of these probes (G-116 and GP-4C) are located in the northwestern corner of the MNL, and two (GP-30B and GP-31B) are located in the southeastern corner. Table 1 presents data from those probes where methane has been detected, including these four probes.

At probes GP-4C, GP-30B, and GP-31B, the water table surface is present above the top of the screen. This indicates that methane is migrating to these locations within the groundwater and that methane is volatilizing in the probe casing. At G-116, methane is likely migrating to the probe via the unsaturated zone and entering the probe via a crack in the casing near the water table surface.

Objectives

The objectives of the proposed LFGCS are as follows:

- To induce a vacuum in the waste mass to create a preferential path for the LFG, routing it through each LFGCS instead of allowing it to migrate off-site

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- To reduce the rate at which methane is dissolved in the groundwater, thereby reducing the potential for off-site methane migration in the groundwater
- To combust collected LFG in a flare so as to reduce emissions

Proposed Conceptual Plan

Overall System Design

The proposed LFGCS will consist of two separate systems, both located within the MNL footprint. One system will be located in the southeastern corner of the MNL, and the other will be located in the northwestern corner. In the southeastern corner, existing gas vents EWL-2, DV-3, DV-12, SV-12, DV-13, and UAV-2 will be connected by pipeline to a blower, which will convey the LFG to the solar flare, which is currently at gas vent SV-12. The new blower and the solar flare will be installed in the vicinity of the compressor building/SV-12 area. The solar flare that is currently installed on gas vent DV-3 will be moved to DV-6 after cover repairs are completed. In addition, the system will be designed such that probes GP-30B and GP-31B could be connected to the blower if the water table surface declines to below the top of the screen.

In the northwestern corner, existing gas vents EWL-10, EWL-11, EWL-12, DV-1, DV-8, and UAV-1 will be connected by pipeline to a blower, which will convey the LFG to the solar flare, which is currently at existing gas vent DV-1. The new blower and the solar flare will be installed in the vicinity of DV-1. UAV-6 will be evaluated over the next few weeks to determine if it should be included in the LFGCS. Figure 1 presents the proposed LFGCS layout.

The gas vents to be used in the LFGCS were selected based on their locations with respect to the perimeter probes where methane was detected, the presence of methane and/or pressure at the gas vent, and their screened intervals, which were open to unsaturated refuse. Table 2 presents the pertinent gas vent construction information. Table 3 presents the historical gas data for the gas vents that have been monitored. Each LFGCS will be re-evaluated after a period of operation to determine if any additional gas extraction points are needed.

System Components and Control

Each LFGCS will consist of a new blower, an existing solar flare conveyance piping, a flame arrestor, an isolation valve, miscellaneous fittings, a control system, a liquid management system, and all necessary safety components.

The blowers will be sized based in part on the length of exposed screen in the vents that will be included in the LFGCS. The blowers and conveyance piping will be sized to deliver -5 inches to

-10 inches water column pressure (vacuum) to the extraction point farthest from the blower for each of the systems. The system will be sized large enough to allow for potential future expansion of up to at least 2-3 additional vertical extraction wells per system. Our preliminary evaluation and discussions with manufacturers suggests that a 3 horsepower single-phase blower will be appropriate for each system. Therefore, the existing 100 amp service will be sufficient to power the existing leachate extraction system and the proposed LFGCS.

A pipe size evaluation has been performed and indicates that a 4-inch-diameter conveyance pipe will be sufficient for each individual LFGCS. A 6-inch-diameter conveyance pipe for a portion of the gas collection system will be considered to allow for flexibility for potential future additions to the system. The LFG conveyance piping will be installed with a minimum 2% slope, with the majority of the piping having a 3% slope or greater. Two locations (one in the northwest and one in the southeast) have been identified as low points in the LFG conveyance piping system. A condensate sump or dripleg will be installed at these locations, and the collected condensate will be either gravity-drained to a nearby existing sump or pumped via pneumatic pumps to the leachate extraction system forcemain.

Wellheads will be installed at each LFG vent location and will include sample ports for monitoring methane, carbon dioxide, oxygen; well pressure; header pressure; differential pressure (flow measurement by orifice plate); and temperature.

Controls will be installed to monitor flare temperature at the two solar flares that will receive the collected LFG. These controls will shut the blowers down when no flame is detected and will restart the blower after a preset amount of time. A pneumatic fail-close actuated valve will be installed on both LFGCS pipes on the landfill side of each blower. This valve will open when the blower starts and fail-close when the blower is shut down. A timer will be installed to allow each LFGCS to cycle on and off at preset intervals or to be set for continuous operation. This will allow for flexibility in operating each LFGCS, in case the methane quality decreases during operation. Hours and cycles will also be recorded for each blower. The total flow for each system will be measured by an orifice plate flowmeter located between the blower and the solar flare. A security fence will be installed around each blower/flare system.

As part of each LFGCS installation, windshields with bird deterring spikes will be installed at each solar flare location, which will aid in maintaining combustion in windy conditions and eliminate the potential for injured birds.

Mr. Walter Nied
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Please provide comments on this proposed Conceptual Plan at your earliest convenience. We will be working on a more detailed design plan concurrently with the U.S. EPA's review of this Conceptual Plan. Upon receipt of the U.S. EPA's comments on this Conceptual Plan, RMT will finalize a more detailed design plan and submit it to the U.S. EPA for review and approval.

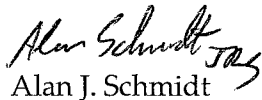
If you have any questions, please contact me, at (608) 662-5268, or Al Schmidt, at (312) 575-0200.

Sincerely,

RMT, Inc.



Jason Schoephoester
Environmental Scientist

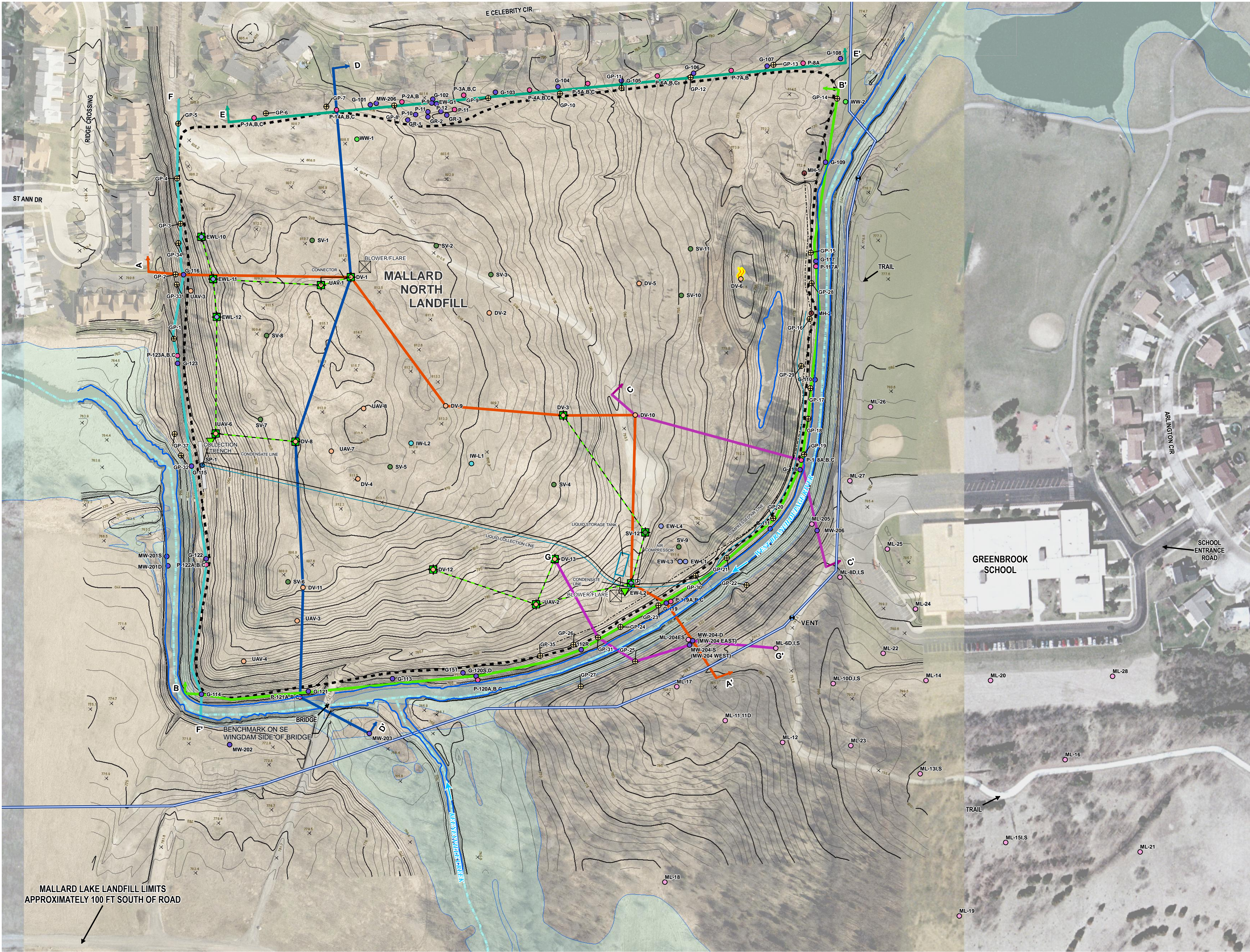


Alan J. Schmidt
Project Manager

Attachments: Figure 1 – Proposed Landfill Gas Collection System Layout
Table 1 – Gas Probes With Significant Methane Detections
Table 2 – Gas Vent/Extraction Well Inventory
Table 3 – Historical Landfill Gas Vent Monitoring Data

cc: Tom Rivera – IEPA
Omprakash Patel – Weston Solutions, Inc.
Joe Benedict – Forest Preserve District of DuPage County

Figure 1
Proposed Landfill Gas Collection System Layout



LEGEND

APPROXIMATE LANDFILL LIMITS
REPORTED LEACHATE COLLECTION TRENCH (APPROXIMATE LOCATION)

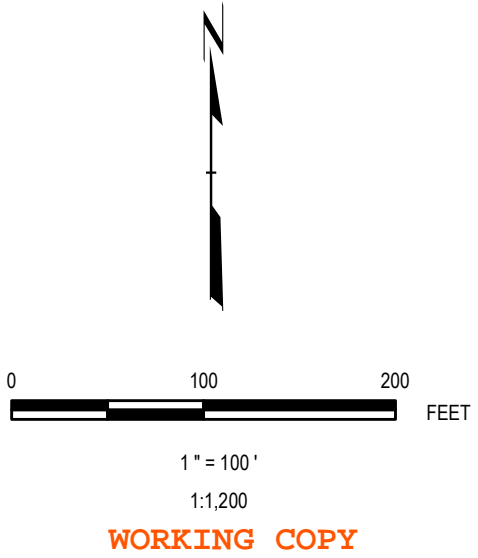
STAND PIPE
PRIVATE WELLS
MONITORING WELLS
PIEZOMETERS
LEACHATE PIPE
GAS VENTS
GAS VENTS (P)
GAS EXTR HEAD WELLS
LEACH GAS EXTR WELLS
GAS PROBES

FEMA 100-YR FLOOD PLAIN
APPROXIMATE RIVER & STREAM CENTERLINES
780 TOPOGRAPHIC CONTOUR (CONTOUR INTERVAL IS ONE FOOT)
EXISTING 16" FORCE MAIN
FORCE MAIN VENT
GAS PROBE LOCATION (RMT 2009)
SOLAR FLARE

CROSS SECTIONS
A-A'
B-B'
C-C'
D-D'
E-E'
F-F'
G-G'

GAS HEADER PIPE
BLOWER/FLARE
CONDENSATE KNOCKOUT
GAS EXTRACTION WELL

- NOTES:**
1. BASE AERIAL IMAGE (SHOWN WEST OF 1037100' EASTING IN MAP COORDINATES) AND CONTOURS GENERATED BY THE BASE MAPPING CO. LTD. FOR FOREST PRESERVE DISTRICT OF DUPAGE COUNTY, APRIL 2009 (FLIGHT DATE 04/10/2009).
 2. BASE AERIAL IMAGE (SHOWN EAST OF 1037100' EASTING IN MAP COORDINATES) FROM USGS URBAN IMAGERY DATASET, CHICAGO, IL, MARCH 2005.
 3. ROADS DATA FROM ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE.
 4. FEMA FLOOD PLAIN INFORMATION PROVIDED BY THE DUPAGE COUNTY, ILLINOIS GIS DEPARTMENT.
 5. LANDFILL LIMITS AND SURFACE WATER FEATURES ESTIMATED BY AERIAL PHOTOGRAPH.
 6. SAMPLE LOCATION DATA FROM MARTINEZ CORPORATION.
 7. MAP PROJECTION & COORDINATE SYSTEM IS ILLINOIS STATE PLANE EAST NAD83.
 8. APPROXIMATE HISTORICAL WELL AND PROBE LOCATIONS FROM DUPAGE COUNTY FOREST PRESERVE DISTRICT AND BFL 2009 PROBE LOCATIONS FROM DIFFERENTIALLY CORRECTED GPS DATA COLLECTED BY RMT, JUNE 2009.
 9. REPORTED LEACHATE COLLECTION TRENCH LOCATION IS SHOWN APPROXIMATELY BASED ON DRAWING NO. 1 CONTAINED IN REPORT TITLED "FEASIBILITY STUDY REPORT, MALLARD NORTH LANDFILL, HANOVER PARK, ILLINOIS", DATED NOVEMBER 1995 AND PREPARED BY EMCON.



WORKING COPY

PROJECT: **MALLARD NORTH LANDFILL
FOREST PRESERVE DISTRICT OF DUPAGE COUNTY**

SHEET TITLE: **LANDFILL GAS INVESTIGATION WORK PLAN
SITE BASE MAP**

DRAWN BY: MCKEEFRY J	SCALE: 1" = 100'	PROJ. NO. 00-06809.03
CHECKED BY: BRAUN N	AS NOTED	FILE NO. 68090311.mxd
APPROVED BY:	DATE PRINTED:	FIGURE 1
DATE: AUGUST 2009	8/14/2009	

RMT

744 Highland Trail
Madison, WI 53717-1934
P.O. Box 8923 53708-8923
Phone: 608-831-4444
Fax: 608-831-3334

Tables

Table 1
Gas Probes With Significant Methane Detections
Mallard North Landfill, Hanover Park, Illinois

ID	Date	CH4 (%)	Pressure (" H2O)	Depth to Water (ft B/TOC)	Depth to Top of Screen (ft/BTOC)	Comments
GP-2A	6/3/2009	0.2	NM	9.57	15.37	1st monitoring round
	6/17/2009	0.6	+0.10	13.00		
	7/22/2009	0.0	0.00	15.60		LCT pumps started 7/15
	7/29/2009	3.0	+0.10	14.53		
	8/4/2009	2.9	0.00	15.65		
GP-4C	6/3/2009	0.5	NM	dry	30.14	1st monitoring round
	6/17/2009	2.7	+0.90	18.40		
	7/22/2009	12.8	0.00	18.40		LCT pumps started 7/15
	7/29/2009	24.2	+0.20	18.24		
	8/4/2009	19.7	0.00	18.19		
GP-17	6/3/2009	10.7	NM	NM	13.25	1st monitoring round
	6/17/2009	1.1	+0.40	5.21		
	7/22/2009	0.0	+0.60	4.55		LCT pumps started 7/15
	7/29/2009	0.0	+0.20	4.15		
	8/4/2009	0.0	0.00	4.03		
GP-26B	6/3/2009	0.6	NM	16.76	27.45	1st monitoring round
	6/17/2009	0.1	+0.10	16.67		
	7/22/2009	1.8	-3.00	18.54		LCT pumps started 7/15
	7/29/2009	2.0	-0.50	18.90		
	8/4/2009	1.9	-0.10	19.42		
GP-30B	6/3/2009	0.0	NM	dry	18.06	1st monitoring round
	6/17/2009	13.2	+0.10	7.83		
	7/22/2009	17.3	+0.20	7.92		LCT pumps started 7/15
	7/29/2009	11.8	-0.10	8.15		
	8/4/2009	13.8	+0.10	7.46		
GP-31B	6/3/2009	0.0	NM	dry	18.09	1st monitoring round
	6/17/2009	72.8	+0.10	15.34		
	7/22/2009	79.6	+0.20	16.57		LCT pumps started 7/15
	7/29/2009	41.7	+0.10	16.72		
	8/4/2009	86.6	+0.10	17.39		
GP-33A	6/17/2009	62.7	+0.40	13.84	16.13	
	7/22/2009	7.5	0.00	15.50		LCT pumps started 7/15
	7/29/2009	4.1	+0.20	15.47		
	8/4/2009	1.8	0.00	15.65		
G-116	5/7/2009	76.1	+24.00	12.24	36.89	1st monitoring round
	6/3/2009	80.0	+9.50	12.26		casing likely cracked at ~12' B/TOC
	6/17/2009	65.1	0.00	11.90		
	7/22/2009	73.0	+0.10	NM		LCT pumps started 7/15
	7/29/2009	73.4	+0.10	12.72		
	8/4/2009	73.9	NM	12.93		
MW-204D East (Shallow)	2/9/2009	30.3	0.00	21.49	22.02	
	3/5/2009	15.0	0.00	21.09		
	3/11/2009	8.6	0.00	20.44		
	4/8/2009	12.8	0.00	20.07		
	5/7/2009	23.3	0.00	19.65		
	6/3/2009	19.1	0.00	18.20		
	6/17/2009	0.4	0.00	20.00		
	7/22/2009	60.0	0.00	20.65		LCT pumps started 7/15
	7/29/2009	48.3	0.00	20.72		
	8/4/2009	37.8	0.00	21.00		

Notes:

NM = not measured

Created by: J. Schoephoester, 8/5/09

Checked by: B. Zimmerman, 8/5/09

Table 2
Gas Vent/Extraction Well Inventory
Mallard North Landfill, Hanover Park, Illinois

ID	Vent Dia. ⁽¹⁾ (in.)	Depth to Bottom ⁽²⁾ (ft. bgs)	TOC Elevation ⁽²⁾ (ft BTOC)	Bottom of Vent or Top of Sediment as Measured ⁽²⁾ (ft a.m.s.l.)	Top of Screen ⁽³⁾ (ft a.m.s.l.)	Bottom of Screen ⁽³⁾ (ft a.m.s.l.)	Depth to Water ⁽²⁾ (ft btoc)	Water Elevation ⁽²⁾ (ft a.m.s.l.)	Feet Screen Open ⁽²⁾	Well/Probe Condition ⁽²⁾ (OK/NOT OK)
DV-1	6	41.23	817.41	776.18	808.41 ⁽⁶⁾	776.18	19.35	798.06	10.35 ⁽⁵⁾	Solar Flare installed and burning
DV-2	NR	NR	813.61	NR	NA	NA	NR	NR	NA	NR
DV-3	4	14.40	808.53	794.13	800.00 ⁽⁵⁾	794.13	12.38	796.15	3.85 ⁽⁵⁾	Solar Flare installed and burning
DV-5	NA	NR	NR	NR	NA	NA	NR	NR	NA	NOT OKAY- Broken off below ground
DV-6	4	22.97	792.49	769.52	784.00 ⁽⁵⁾	769.52	11.43	781.06	2.94 ⁽⁵⁾	OK
DV-8	6	54.75	816.35	761.60	808.27	761.60	19.74	796.61	11.66	OK
DV-9	4	NR	NR	NR	812.90	751.90	NR	NR	NA	OK
DV-10	4	16.10	793.80	777.70	787.19	777.70	5.27	788.53	-1.34	OK
DV-11	4	NR	NR	NR	810.92	752.42	NR	NR	NA	NOT OKAY-screen exposed
DV-12	4	45.00	805.08	760.08	805.05	760.08	25.78	779.30	25.75	OK
DV-13	4	26.46	800.78	774.32	794.41	774.32	8.89	791.89	2.52	OK
SV-6	1.5	NR	NR	NR	NA	NA	NR	NR	NA	NOT OKAY-threaded steel pipe
SV-9	4	17.05	NR	NR	779.68	766.68	1.54	NR	NA	OK
SV-11	4	NR	NR	NR	783.37	768.37	NR	NR	NA	NR
SV-12	4	NR	792.56	NR	787.71	770.71	NR	NR	NA	Solar Flare installed and burning
EWL-1	6	30.42	784.70	754.28	774.49	754.28	4.06	780.64	-6.15	Hi water table
EWL-2	4	30.87	786.26	755.39	777.07	755.39	NR ⁽⁴⁾	771.00	6.07	OK
EWL-3	4	23.81	783.06	759.25	NA	759.25	2.50	780.56	NA	Hi water table
EWL-4	NR	NR	791.65	NR	NA	NA	NR	NR	NA	NR
EWL-10	4	32.00 ⁽⁶⁾	809.07	777.07	801.70 ⁽⁶⁾	791.33	12.00 ⁽⁶⁾	797.07	4.63	OK
EWL-11	NR	49.00 ⁽⁶⁾	807.86	758.86	796.86 ⁽⁶⁾	758.86	17.00 ⁽⁶⁾	790.86	6.00	NR
EWL-12	NR	41.00 ⁽⁶⁾	807.11	766.11	803.00 ⁽⁶⁾	766.11	10.00 ⁽⁶⁾	797.11	5.89	NR
UAV-1	4	23.00 ⁽⁶⁾	816.91	793.91	811.91 ⁽⁶⁾	793.91	15.00 ⁽⁶⁾	801.91	10.00	Solar Flare installed and burning
UAV-2	NR	20.00 ⁽⁶⁾	792.96	772.96	792.46 ⁽⁶⁾	772.96	6.50 ⁽⁶⁾	786.46	6.00	NR
UAV-3	6	NR	NR	NR	NA	NA	NR	NR	NA	OK
UAV-4	6	5.00	793.28	788.28	NA	NA	dry	dry	NA	OK
UAV-5	NR	NR	798.06	NR	NA	NA	NR	NR	NA	NR
UAV-6	NR	12.00 ⁽⁶⁾	799.31	787.31	796.31 ⁽⁶⁾	787.31	6.00 ⁽⁶⁾	793.31 ⁽⁶⁾	3.00 ⁽⁶⁾	NR
UAV-8	NR	NR	815.75	NR	NA	NA	NR	NR	NA	NR

Notes:

NR= not recorded

NA=not available

Bold= Vents to be connected to the proposed gas collection system.

⁽¹⁾ Probe diameters obtained from Testing Services Corporation boring logs, where available, or RMT site visit on March 9 and 10, 2009.

⁽²⁾ Data obtained during RMT site visit on March 9 and 10, 2009.

⁽³⁾ Top of screen and bottom of screen elevations obtained from the Site Investigation Report (EMCON, 1999), except as noted.

⁽⁴⁾ The liquid level at EWL-2 is maintained by pneumatic liquid pump at approximately 12 feet below ground surface.

⁽⁵⁾ Value is estimated based on available data.

⁽⁶⁾ Value is from information obtained during the downhole video camera investigation.

Created by: J. Schoephoester, 8/13/09

Checked by: N. Braun, 8/14/09

Table 3
Historical Landfill Gas Vent Monitoring Data
Mallard North Landfill, Hanover Park, Illinois

ID	Date	CH4 (%)	Pressure (" H2O)	Depth to Water (ft B/TOC)	Comments
DV-1	3/11/2009	70.8	-0.18	19.35	turbine removed 3/10/09
	4/8/2009	69.8	+0.65	NM	
	5/7/2009	66.1	+0.55	NM	
	6/3/2009	67.8	+0.50	NM	
	6/17/2009	66.8	+0.40	NM	
	7/22/2009	66.2	0.00	NM	Solar flare started 7/16/09
	8/4/2009	67.2	0.00	NM	
UAV-1	3/11/2009	78.2	-0.10	18.58	turbine removed 3/10/09
	4/8/2009	72.1	+1.60	NM	
	5/7/2009	67.4	+1.70	NM	
	6/3/2009	68.7	+1.20	NM	
	6/17/2009	68.4	+0.90	NM	
	7/22/2009	66.5	0.00	NM	Solar flare started 7/16/09
	8/4/2009	67.0	0.00	NM	
DV-3	3/11/2009	0.0	0.00	12.38	turbine removed 3/10/09
	4/8/2009	78.4	+0.25	NM	
	5/7/2009	78.7	+0.06	NM	
	6/3/2009	80.6	+0.08	NM	
	6/17/2009	77.8	0.00	NM	
	7/22/2009	75.9	-0.10	NM	Solar flare started 7/16/09
	8/4/2009	76.2	-0.30	NM	
UAV-4	3/11/2009	60.5	-0.04	dry @ 5.0	turbine removed 3/10/09
	4/8/2009	62.3	+0.03	NM	
	5/7/2009	60.1	0.00	NM	
	6/3/2009	62.3	0.02	NM	
	6/17/2009	60.8	0.00	NM	
	7/22/2009	59.7	0.00	NM	
DV-6	3/11/2009	12.2	0.00	11.43	turbine removed 3/10/09
	4/8/2009	5.0	0.00	NM	
	5/7/2009	36.0	0.00	NM	
	6/3/2009	39.7	0.00	NM	
	6/17/2009	42.5	0.00	NM	
	7/22/2009	23.0	0.00	NM	
UAV-6	8/14/2009	62.3	0.00	NM	turbine removed 8/14/09 AM
DV-8	3/11/2009	70.5	-0.06	19.74	turbine removed 3/10/09
	4/8/2009	74.2	+0.10	NM	
	5/7/2009	73.1	+0.35	NM	
	6/3/2009	70.9	+0.22	NM	
	6/17/2009	69.4	+0.20	NM	
	7/22/2009	68.5	+0.10	NM	

Table 3
Historical Landfill Gas Vent Monitoring Data
Mallard North Landfill, Hanover Park, Illinois

ID	Date	CH4 (%)	Pressure (" H2O)	Depth to Water (ft B/TOC)	Comments
DV-12	3/11/2009	0.9	0.00	25.78	turbine removed 3/10/09
	4/8/2009	71.3	+0.02	NM	
	5/7/2009	69.2	0.00	NM	
	6/3/2009	70.0	0.00	NM	
	6/17/2009	64.2	0.00	NM	
	7/22/2009	66.8	0.00	NM	
SV-12	6/3/2009	80.3	+0.10	NM	retrofitted for sampling
	6/17/2009	74.7	0.00	NM	
	7/22/2009	NM	NM	NM	Solar flare started 7/16/09
DV-13	6/3/2009	18.1	0.00	NM	turbine removed 3/10/09
	6/17/2009	27.3	0.00	NM	
	7/22/2009	28.1	0.00	NM	
EWL-10	3/11/2009	0.4	0.00	13.02	turbine removed 3/10/09
	4/8/2009	41.6	0.00	NM	
	5/7/2009	42.8	-0.06	NM	
	6/3/2009	20.8	0.00	NM	
	6/17/2009	23.3	0.00	NM	
	7/22/2009	63.1	0.00	NM	
EWL-11	3/11/2009	68.4	0.00	NM	turbine removed 3/10/09
	4/8/2009	69.5	0.00	NM	
	5/7/2009	69.2	+0.04	NM	
	6/3/2009	66.8	0.00	NM	
	6/17/2009	58.9	0.00	NM	
	7/22/2009	65.2	0.00	NM	

Notes:

NM= not measured

Created by: J. Schoephoester, 8/5/09

Checked by: B. Zimmerman, 8/5/09